

ABSTRACT

A catalyst including a catalytic phase supported by an electronically active support matrix. An electronic interaction that occurs between the catalytic phase and support matrix leads to perturbations in the magnitude and/or spatial distribution of electron density at or near the surface of the catalytic phase. The electronic interaction originates from an overlap of wavefunctions associated with electron density of the catalytic phase with wavefunctions associated with electron density of the support matrix. Embodiments include those in which the electronic interaction is of the bonding-type, anti-bonding type or donor-acceptor type. Filled, partially filled or unoccupied orbital states may participate in the electronic interaction. The perturbation in electron density induced by the electronic interaction modifies the catalytic properties of the catalytic phase.